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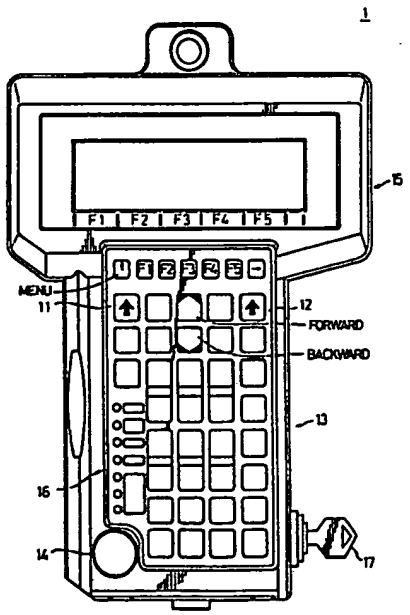
(54) **TEACHING INSTRUCTION PANEL FOR INDUSTRIAL ROBOTS.**

(57) This invention relates to a teaching instruction panel for industrial robots, which is capable of being utilized without any difference by either right-handed or left-handed persons and carrying out a shift operation in accordance with a mode of utilization of a user. This teaching instruction panel for robots has a plurality of keys (13) for use in teaching a robot to make actions, and two shift keys (11, 12) in the opposite positions in the upper front portion thereof. The effectiveness of an operation of at least one of these two shift keys is registered in advance in a control unit. Various actions are taught to a robot effectively by a combination of an operation of the effective shift key and the operations of the mentioned set of keys.



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DESCRIPTION

TITLE OF THE INVENTION

Teaching Panel for Robot Apparatus

TECHNICAL FIELD

The present invention relates to a teaching panel for a robot apparatus, more particularly to a teaching panel for a robot apparatus provided with shift keys to enable reliable teaching operations.

BACKGROUND ART

Figure 1 shows an example of a conventional teaching panel for a robot apparatus. As is well known, the teaching panel is connected to a control unit (not shown) which directly controls the robot apparatus. A worker stands near the robot apparatus, holds the teaching panel 1', and for example, brings the hand of the robot mechanical unit (not shown) above the workpiece, makes the hand grasp the workpiece, moves the arm of the robot mechanical unit, makes it carry the workpiece to another position, and instructs other operations so as to drive the robot apparatus through the control unit. Therefore, the teaching panel 1' is provided with an operational key unit 13' on which a variety of operational keys are arranged, an indicator unit 16' which indicates the taught operations and the operating state of the robot apparatus, and an emergency stop pushbutton switch 14' for emergency stops in the event of erroneous operations of the robot apparatus etc. To perform the above operations, there is further provided a connection point switching key 17' for electrically connecting the teaching panel 1' to the control unit.

Recently, a demand has arisen for a greater safety in robot teaching operations. Namely, with only the operation of the operational keys of the operational key unit 13', for example, if a finger unintentionally touches an unrelated operational key, the erroneous

operation would immediate lead to an unwanted operation of the robot apparatus, which would be very dangerous. Therefore, safety is maintained by applying an interlock based on a two-step operation so that the operation of the operational keys is effective only when a shift key 11 is depressed.

The teaching panel 1' of Fig. 1 is designed so that the teaching panel is held by the left hand and the predetermined operational keys can be pushed by the thumb of the right hand while the shift key 11 is pushed by the middle finger of the right hand.

As clear from Fig. 1, the teaching panel 1' is made for right handed workers, so has the problems of a lack of operability by left handed workers, which might cause erroneous operations.

If, to resolve this problem, teaching panels for right handed persons and teaching panels for left handed persons were made separately, not only would the price of the equipment rise, but also there would be a need for a modification of connections and the possibility of secondary erroneous operations accompanying the same.

Further, even when right handed workers use the teaching panel 1' shown in Fig. 1, they must change the angle of their right hands about the middle fingers pushing the shift keys 11 to reach the operational keys to be pushed. Depending on the position of the operational key, this can be a troublesome operation, and a good operability is not necessarily guaranteed.

DISCLOSURE OF THE INVENTION

An object of the present invention is to provide a teaching panel for a robot apparatus which is applicable for both right handed and left handed workers.

Another object of the present invention is to provide a teaching panel for a robot apparatus which enables a shift key operation according to the mode of utilization by users, to further improve the operability thereof.

According to the present device, there is provided a teaching panel for a robot apparatus having a plurality of keys for teaching a robot apparatus an operation and two shift keys at the front at opposing positions, the operation of at least one of said two shift keys being made valid and being registered in advance, comprised to enable an effective teaching of an operation to a robot apparatus by a combination of operations of said effective shift key and operations of said plurality of keys.

Two shift keys are provided at opposing positions and the validity of the operation of one of the same is registered in advance. Accordingly, use by either a right handed person or left handed person is possible.

Further, by placing the shift keys at appropriate positions, operation of the shift keys by any finger of the hand holding the teaching panel, for example, the thumb, becomes possible and operation of the operational keys by the fingers of the other hand becomes possible.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a front view of a conventional teaching panel;

Fig. 2 is a front view of a teaching panel according to an embodiment of the present device; and

Fig. 3 is a connection diagram of switches of a teaching panel according to an embodiment of the present device and switches of a control unit.

BEST MODE OF CARRYING OUT THE INVENTION

An embodiment of the present device will now be explained with reference to Fig. 2 and Fig. 3.

Figure 2 shows a front view of a teaching panel. In the figure, the teaching panel 1 has an operational key unit 13 provided with a plurality of operational keys, a display unit 15, and indicator unit 16, a system key 17, and an emergency stop PBS 14.

The teaching panel 1 is further provided with two shift keys 11 and 12 at the front at opposing positions.

The operational key unit 13 has a thickness which enables it to be held by one hand. When the teaching panel 1 is gripped by the left hand, the left side shift key 11 is located at a position enabling easy operation of the shift key 11 by the thumb of the left hand, which is a free finger. Similarly, when the teaching panel 1 is gripped by the right hand, the right side shift key 12 is located at a position enabling easy operation of the shift key 12 by the free thumb.

By constructing the teaching panel 1 in the above way, for example, right handed worker can hold the teaching panel in the left hand and operate the shift key 11 with the thumb of the left hand and, while doing so, use the right hand fingers to freely operate, for example, the "FORWARD", "BACKWARD", and other operational keys. A right handed worker can hold the teaching panel in the right hand and operate the shift key 12 with the thumb of the right hand and while doing so, use the left hand fingers to select the operational keys.

Further, some users can hold the teaching panel in the left hand and operate the shift key 12 with the index finger of the right hand, and while doing so, use the thumb to operate the operational keys and perform other operations.

By providing two shift keys and constructing the teaching panel as illustrated in the above way, not only is use made possible according to the mode of utilization by the user, but the operability is also improved.

On the other hand, if two shift keys are provided and both are made valid at all times, then there is the chance that the nonintended shift key will be mistakenly operated, and thus safety is reduced. Therefore, usually it is preferable to register one of the shift keys as valid.

Figure 3 shows the connection circuit of a system

key 17, shift keys 11 and 12, switches 51 and 52, and operational key unit 13 when the switch circuit 5 is used as a registration means. The teaching panel 1 is connected to a control unit (not shown), and the teaching operation is performed through the control unit to the robot apparatus. Therefore, the illustrated circuit is formed in the control unit. The switch circuit 5 is mounted in the control unit.

In the illustrated state the key operation of the operational key unit 13 is valid only when the system key 17 is on and the shift key 12 is depressed. Therefore, even if the shift key 11 is mistakenly depressed, the key operation will be invalid.

The user selects either of the switches 51 and 52, or in some cases both, in advance in accordance with the own mode of utilization.

Further, it is possible to realize the registration means by a means other than the switch circuit, i.e., by setting valid and invalid flags for a microprocessor, etc., built in the control unit for performing a judgment of the operational keys.

According to the present invention, a shift key operation according to the mode of utilization of the user can be made, and a teaching panel with a further improved operability without a reduction in the degree of safety is obtained.

INDUSTRIAL APPLICABILITY

A teaching panel for a robot apparatus in accordance with the present invention can be applied for teaching operations is a variety of industrial robot apparatuses.

CLAIMS

1. A teaching panel for a robot apparatus, for teaching operations to the robot apparatus through a control system,

characterized in having a plurality of keys (13) for teaching a robot apparatus an operation and two shift keys (11, 12) at a front thereof at opposing positions,

the operation of at least one of said two shift keys when valid being registered in advance,

and comprised to enable an effective teaching of an operation to a robot apparatus by a combination of operations of said effective shift key and operations of said plurality of keys.

2. A teaching panel for a robot apparatus according to claim 1, characterized in that said shift keys (11, 12) are provided at positions easily operable by free fingers of a hand holding the teaching panel.

Fig. 1 PRIOR ART

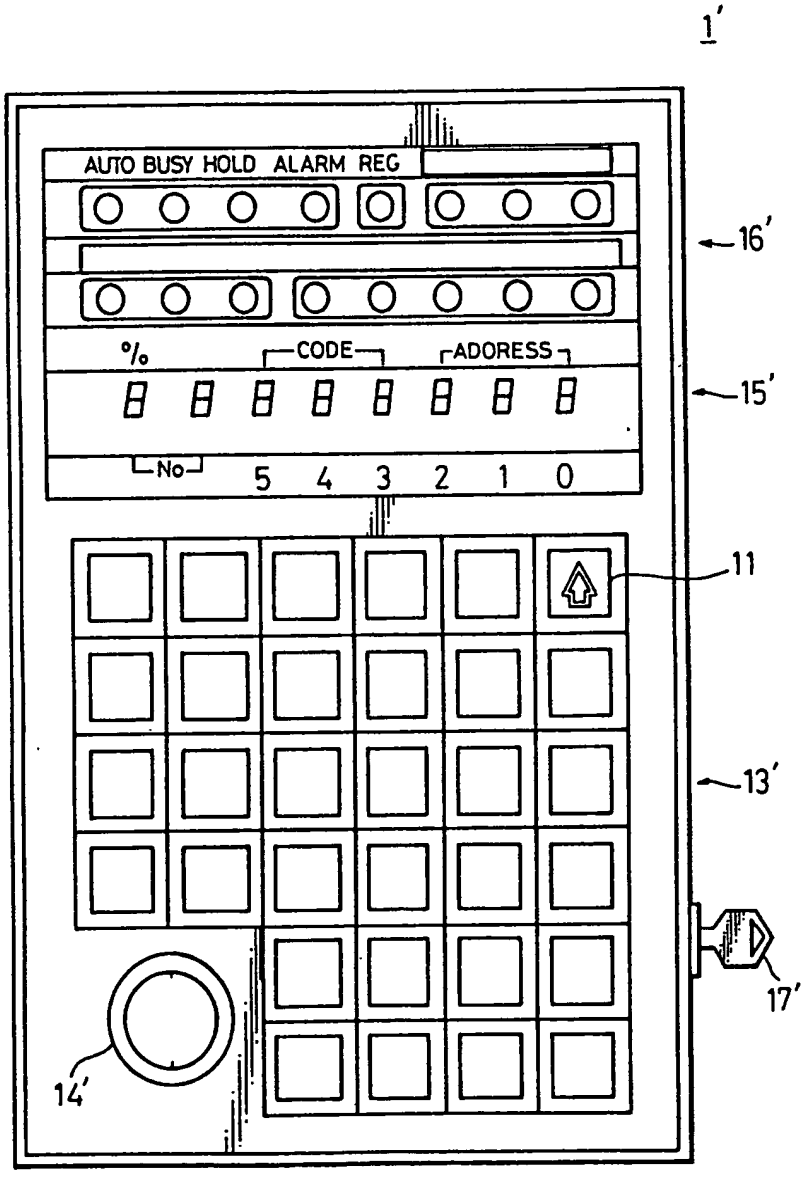


Fig. 2

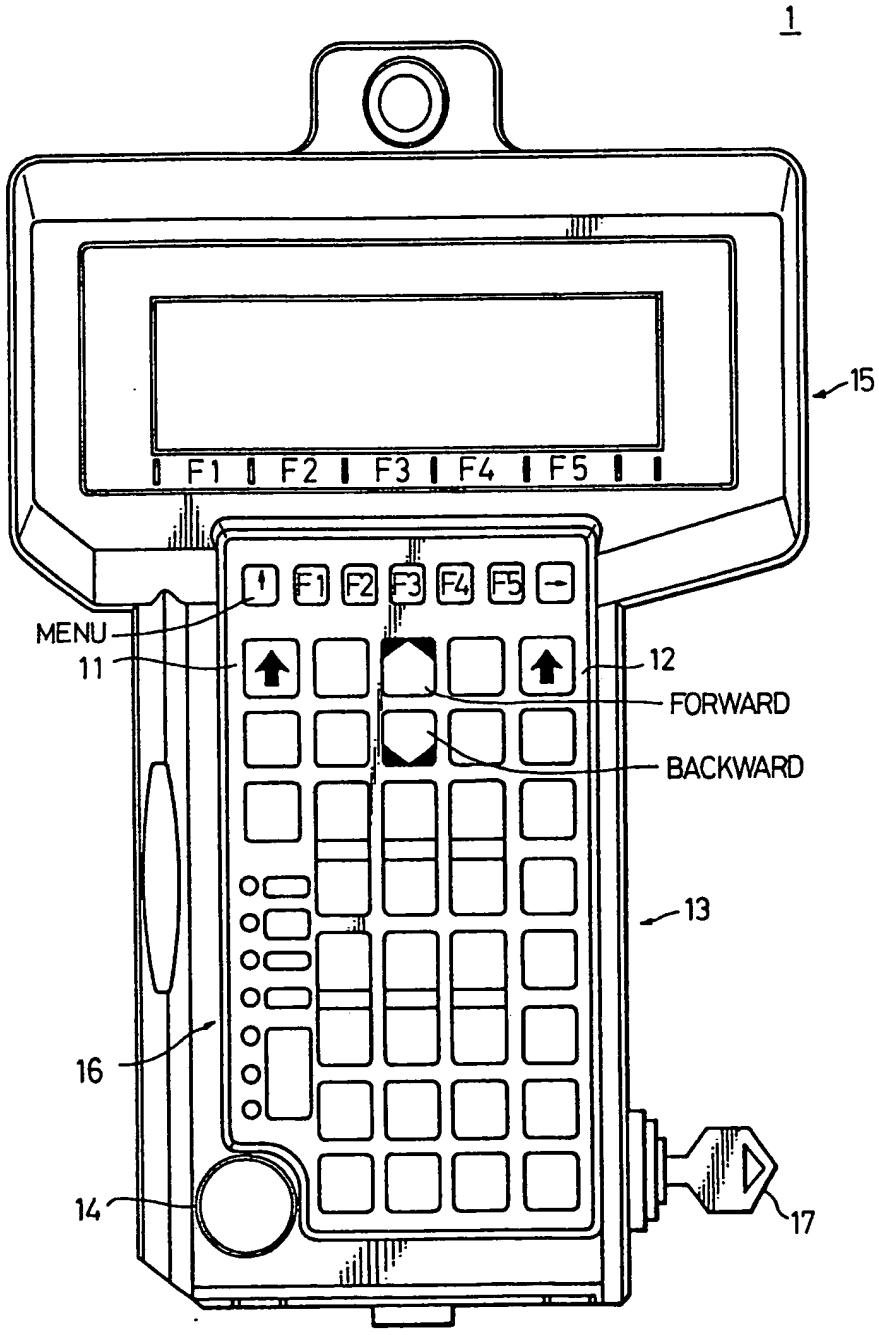
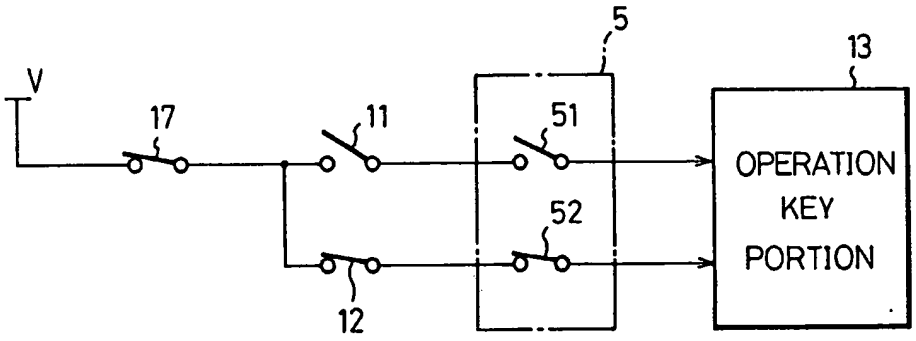


Fig. 3



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EXPLANATION OF REFERENCES

1 ..... teaching panel

2 ..... control unit

11, 12 ... shift keys

13 ..... operational key unit

14 ..... emergency stop

15 ..... display unit

16 ..... indicator unit

17 ..... system key

INTERNATIONAL SEARCH REPORT 00303708

International Application No PCT/JP88/00167

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl[4] B25J9/22, 13/06, G05B19/405, 19/42

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
IPC	B25J9/22, 13/06, G05B19/405, 19/42

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

Jitsuyo Shinan Koho 1926 - 1987
Kokai Jitsuyo Shinan Koho 1971 - 1987

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category [10]	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
A	JP, A, 58-109902 (Fanuc Ltd.) 30 June 1983 (30. 06. 83) (Family: none)	1-2
A	JP, U, 60-153787 (Yaskawa Electric Mfg. Co., Ltd.) 14 October 1985 (14. 10. 85) (Family: none)	1-2
A	JP, U, 61-126305 (Yaskawa Electric Mfg. Co., Ltd.) 8 August 1986 (08. 08. 86) (Family: none)	1-2
A	JP, U, 61-153244 (Fanuc Ltd.) 22 September 1986 (22. 09. 86) (Family: none)	1-2
A	JP, A, 59-227384 (Fanuc Ltd.) 20 December 1984 (20. 12. 84) (Family: none)	1-2

* Special categories of cited documents: [10]

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
April 22, 1988 (22. 04. 88)	May 16, 1988 (16. 05. 88)
International Searching Authority	**Signature of Authorized Officer**
Japanese Patent Office	